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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,477	03/26/2004	John F. Cooper	IL-11267	9778
7590	07/17/2007		EXAMINER	
Ann M. Lee Assistant Laboratory Counsel Lawrence Livermore National Laboratory P.O. Box 808, L-703 Livermore, CA 94551			CHUO, TONY SHENG HSIANG	
			ART UNIT	PAPER NUMBER
			1745	
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			07/17/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/810,477	COOPER ET AL.
	Examiner	Art Unit
	Tony Chuo	1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 25 May 2007.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-5 and 12-20 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-5 and 12-20 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 26 March 2004 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)	5) <input type="checkbox"/> Notice of Informal Patent Application
Paper No(s)/Mail Date _____	6) <input type="checkbox"/> Other: _____

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/25/07 has been entered.

### ***Response to Amendment***

2. Claims 1-5 and 12-20 are currently pending. Claims 6-11 have been cancelled. New claims 12-20 have been added. The previously stated 112 rejection of claims 2-5 is withdrawn. The 103 rejection of claims 1-5 as being unpatentable over Kaschmitter et al in view Boes et al is withdrawn. The amended claims do not overcome the previously stated 102 rejection of claims 1, 3, and 5 as being anticipated by Petricevic et al. Therefore, claims 1-5 and 12-20 are stand rejected under the following 112, 102, and 103 rejections.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-5 and 12-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The terms "wettable aerogel/carbon composite" and "wettable xerogel/carbon composite" are not supported by the specification.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-5 and 12-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what amount of transition metal oxide catalyst is sufficient to accelerate pyrolysis.

7. Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear whether the catalyst is a transition metal oxide or one selected from the group consisting of alkali carbonate, alkaline earth carbonate or phosphoric acid, halide salts, and salts based on sodium aluminum hexafluoride. The Markush group species are not part of the transition metal oxide genus.

8. Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention. It is unclear what amount of porosity prevents percolation of carbon dioxide through its interior.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1, 3, 5, 14, 15, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Petricevic et al ("Planar fibre reinforced carbon aerogel for application in PEM fuel cells", Carbon, vol. 39, no. 6, May 2001, pg. 857-867). The Petricevic reference discloses a fiber reinforced carbon aerogel that is produced by the process comprising: providing a solution of organic precursor aerogel that includes resorcinol and formaldehyde; adding a ceramic fibre or carbon fibre to the precursor to form a precursor mixture; gelling the precursor mixture; drying the composite gel in air; and pyrolyzing the composite gel to form an aerogel/carbon composite (See Experimental). It also discloses a transition metal oxide catalyst that is sodium carbonate (See Introduction). It also discloses RF aerogels that are wettable depending on the hydrophilic character of the reinforcement fibers (See Section 3.2).

Examiner's note: The recitations "anode" & "fuel" have not been given patentable weight because the recitations occur in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a

process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). In addition, the limitation “transition metal oxide catalyst” recited in claim 1 is construed as being one of the species recited in the Markush group of claim 14. Further, it is inherent that the pyrolyzing step taught by Petricevic et al will produce carbon chars that are capable of being combusted in a molten salt electrochemical fuel cell in the range from 500°C to 800°C to produce electrical energy. Lastly, it is also inherent that the reinforced carbon aerogel taught by Petricevic has a porosity that prevents percolation of carbon dioxide through its interior.

#### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 2, 12, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petricevic et al (“Planar fibre reinforced carbon aerogel for application in PEM fuel cells”, Carbon, vol. 39, no. 6, May 2001, pg. 857-867) in view of Erkey et al (US 2004/0029982). The Petricevic reference is applied to claims 1 and 15 for reasons stated above.

However, Petricevic et al does not expressly teach a drying step that is accomplished by supercritical-critical solvent extraction; composites that have a density of at least 0.56 grams/cm<sup>3</sup>; a mole ratio of phenolic resin, resorcinol or catechol to catalyst that is less than about 50 to 1; and a mole ratio of the resorcinol to catalyst that is less than or about 50 to 1. The Erkey reference discloses an resorcinol formaldehyde aerogel that is formed by a drying step under supercritical conditions; an aerogel that has a density from about 0.01 to 2.0 grams/cm<sup>3</sup>; a mole ratio of resorcinol to catalyst that is about 50 to 1 (See paragraphs [0021],[0022],[0029] and Table 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Petricevic reinforced carbon aerogel to include a drying step that is accomplished by supercritical-critical solvent extraction; composites that have a density of at least 0.56 grams/cm<sup>3</sup>; a mole ratio of phenolic resin, resorcinol or catechol to catalyst that is less than about 50 to 1; and a mole ratio of the resorcinol to catalyst that is less than or about 50 to 1 in order to preserve the gel skeleton and minimize shrinkage during drying while maintaining sufficient density for use as an fuel cell electrode, and to control the surface area and electrochemical properties of the resulting gel.

13. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petricevic et al ("Planar fibre reinforced carbon aerogel for application in PEM fuel cells", Carbon, vol. 39, no. 6, May 2001, pg. 857-867) in view of Stepanian et al (US 2002/0094426). The Petricevic reference is applied to claim 1 for reasons stated above.

However, Petricevic et al does not expressly teach ceramic materials that are selected from the group consisting of silica, alumino-silicates, and ash derived from coal or petroleum clays. The Stepanian reference discloses an aerogel composite comprising an aerogel matrix such as organic aerogels made from resorcinol formaldehydes and reinforcing fibers such as silica fibers (See paragraph [0013],[0029]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Petricevic reinforced carbon aerogel to include ceramic materials that are selected from the group consisting of silica, alumino-silicates, and ash derived from coal or petroleum clays in order to improve the durability and thermal and/or electrical conductivity of the aerogel (See paragraph [0012]).

14. Claims 13 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petricevic et al ("Planar fibre reinforced carbon aerogel for application in PEM fuel cells", Carbon, vol. 39, no. 6, May 2001, pg. 857-867) in view of Rhine et al (US 2004/0132845). The Petricevic reference is applied to claims 1, 5, and 15 for reasons stated above.

However, Petricevic et al does not expressly teach carbon materials that comprise graphite. The Rhine reference discloses a carbon aerogel that comprises reinforcement agents such as graphite fibers (See paragraph [0097]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Petricevic reinforced carbon aerogel to include carbon materials that comprise graphite in order to increase the mechanical strength of

the base aerogel composition as well as to increase the electrical conductivity of the aerogel.

### ***Response to Arguments***

15. Applicant's arguments filed 5/25/07 have been fully considered but they are not persuasive.

The applicant argues that Petricevic does not disclose or suggest preparing a fuel. This limitation is not given patentable weight because it's a recitation of intended use in the preamble.

The applicant also argues that Petricevic does not disclose or suggest controlling the amount of catalyst so as to accelerate a later pyrolysis step. There is no evidence to show that the amount of catalyst taught by Petricevic is not enough to accelerate a later pyrolysis step.

The applicant also argues that the Petricevic finished composites are taught to be hydrophobic. Besides hydrophobic composites, Petricevic also teaches numerous examples of fiber reinforced carbon aerogels that are hydrophilic depending on the reinforcement fiber that is used.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

Art Unit: 1745

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC



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PRIMARY EXAMINER